Date & Time

The date and time can be set and the ventilator hours of use (Hour Meter) can be viewed by pressing the Date/Time screen icon.

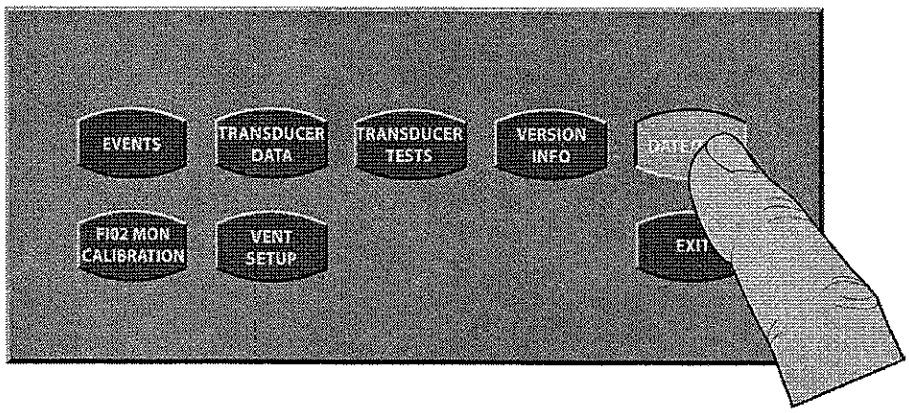


Figure 4.12 Press Date/Time icon

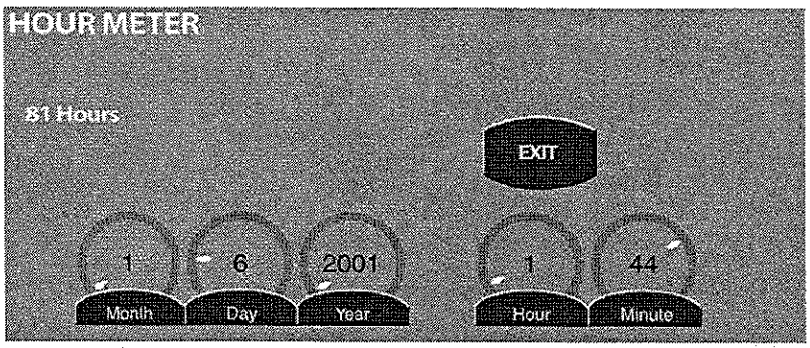


Figure 4.13 Date/Time and Hour Meter screen

To adjust the date and time, select by pressing the touch screen directly over the control to be adjusted (see figure 4.X).

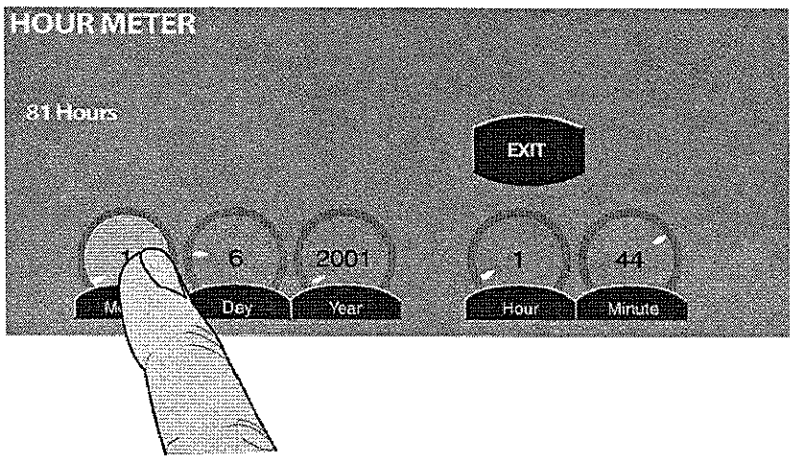


Figure 4.14 Select the month control

Adjust by turning the Data Dial clockwise to increase, or counter clockwise to decrease, the value.

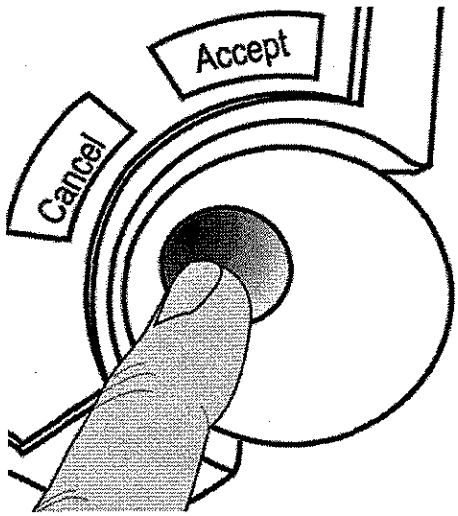


Figure 4.15 Data Dial

FiO2 Calibration

See the Calibration section of this Chapter.

Ventilator Setup

To access the ventilator setup options, press the Vent Setup screen icon.

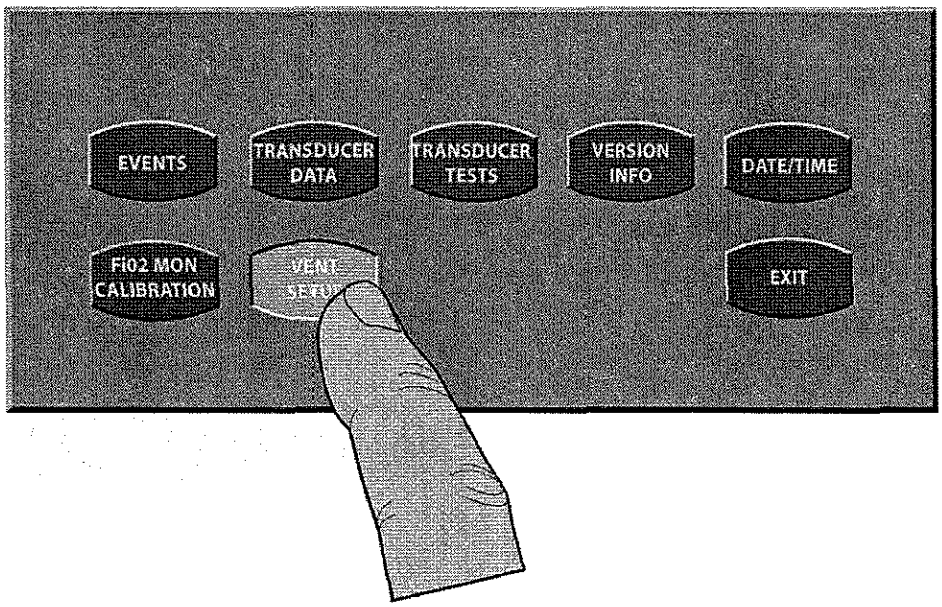


Figure 4.16 Press Vent Setup icon

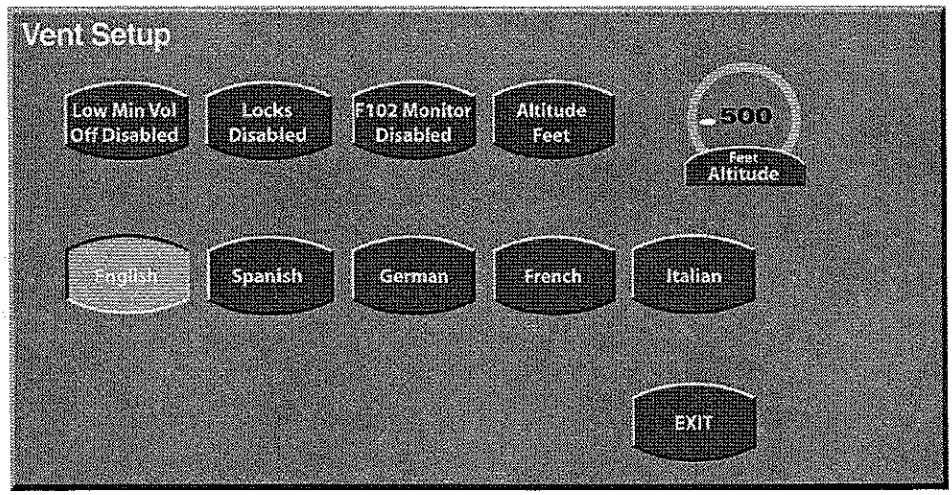


Figure 4.17 Ventilator Setup Screen

Low Min Volume Off

There are two ranges possible for the Low Minute Volume Alarm. They are OFF to 99.9 liters and 0.1 to 99.9 liters. The Low Min Vol Off Disable/Enable screen icon, allows you to toggle between the two ranges.

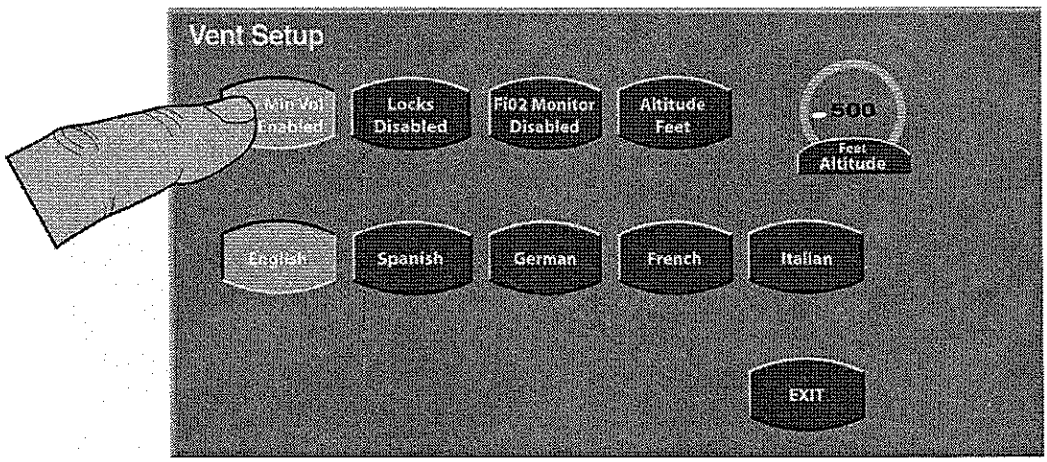


Figure 4.18 Low Min Vol Off Enabled

Locks Disabled

Toggles the control Locks on and off.

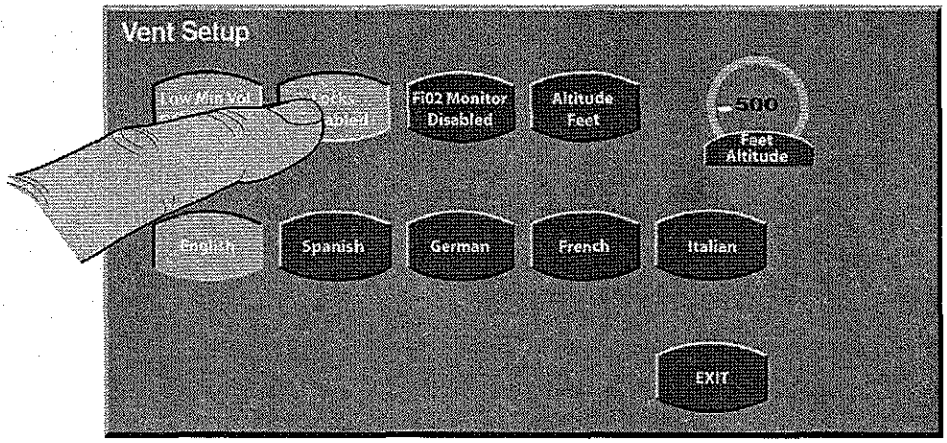


Figure 4.19 Locks Enable/Disable

FiO2 Monitor Disabled

Disables or Enables the FiO2 Monitor Function.

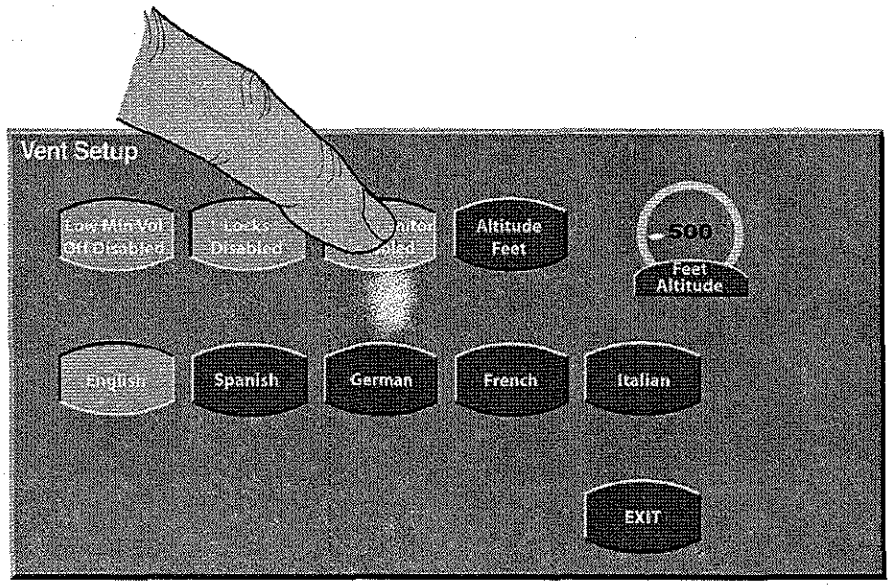


Figure 4.20 Monitor enable/disable

Altitude Adjustment

Allows for adjustment of altitude in feet or meters above sea level.

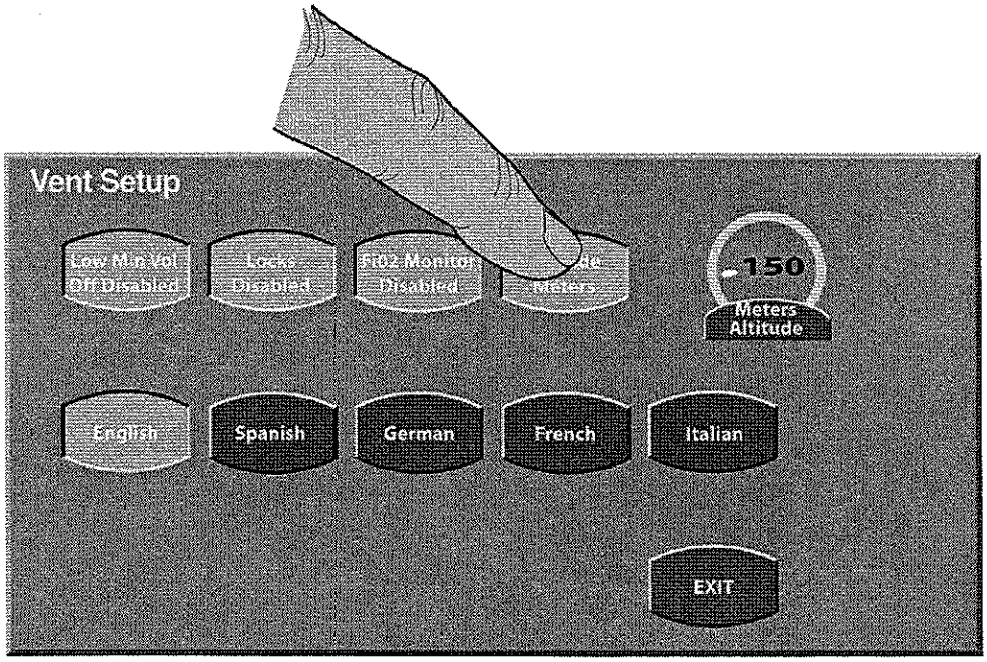
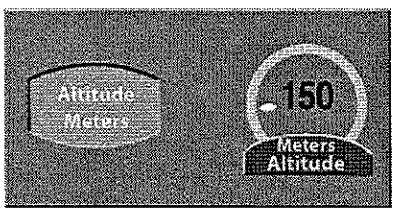


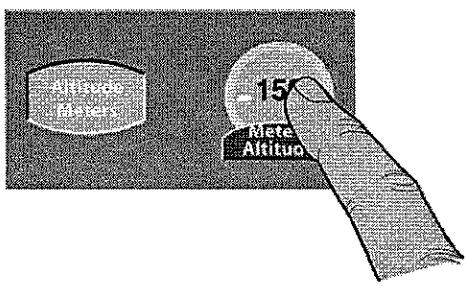
Figure 4.21 Altitude feet/meters

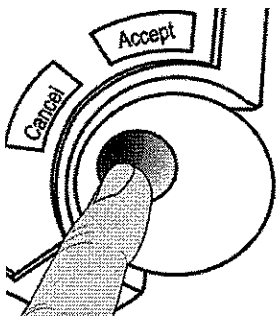


The Altitude screen icon toggles between Feet and Meters and the selection is reflected in the control label (see figure 4.22)

Figure 4.22 Altutude in Meters

To adjust the value, select the control,





then adjust using the data dial.

Language Selection

A choice of 5 languages is available (see figure 4.23). Select a language by pressing the appropriate screen icon. Press EXIT to leave the Ventilator Setup screen and return to the Extended Functions screen

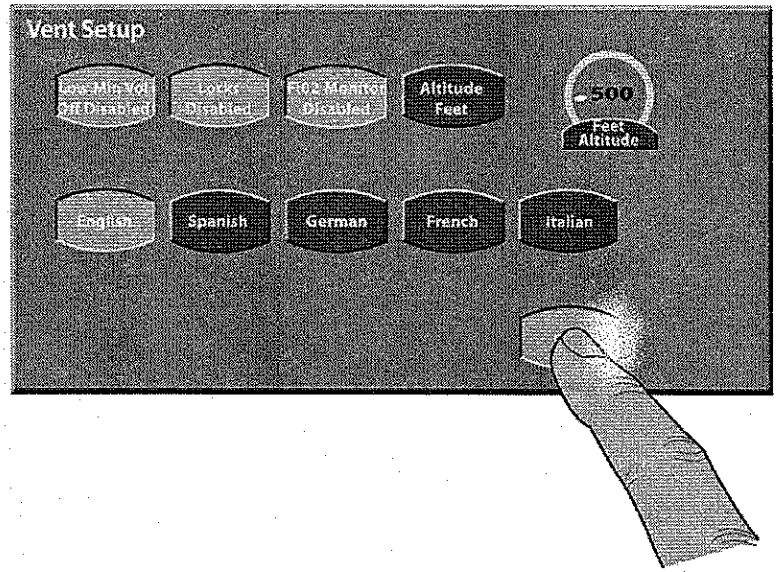


Figure 4.23 Exit Ventilator Setup

Press EXIT again to exit the Special Functions menu

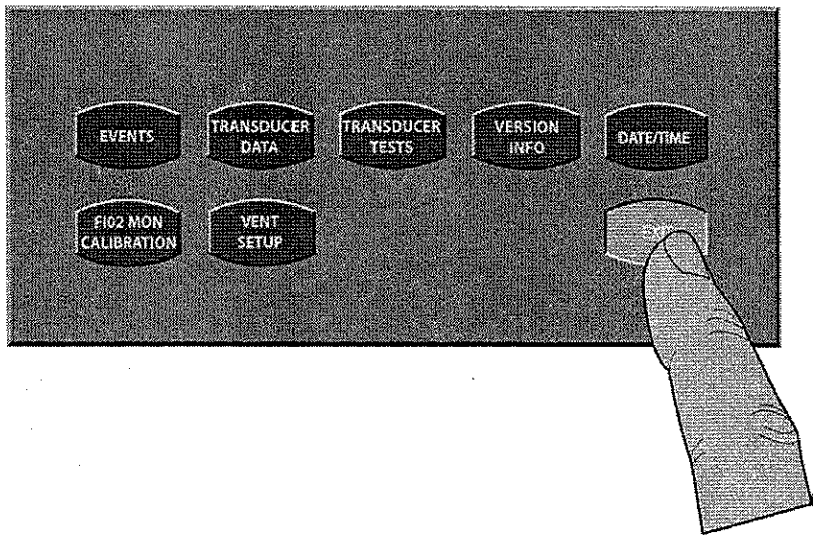


Figure 4.24 Exit Special Functions

The ventilator will begin operation at previously selected settings.

Set up the patient and ventilator operational settings per the instructions your Operator's Manual.

Verification tests

1. Before attaching the Vela to a new patient, perform the following Operational verification checks.

2. Turn on the Vela, choose New Patient and Accept. This will return all settings to the defaults.

3. To check monitor performance, allow the ventilator to operate for two minutes. View the monitored parameters. The values should appear as follows:

Parameter	Value
Minute volume	6 L± 1.2 L
Tidal Volume	500 ml ± 100 ml
I:E Ratio	1:6.1 ± 10%
Breath Rate	12 bpm ± 2 bpm
PIP	Should equal manometer display ± 5 cmH2O
MAP	N/A
PEEP	5 cmH2O ± 2 cmH2O
Inspiratory Time	0.68 seconds ± .05 seconds

3. Check the alarms as follows:

   a. Power Fail Check

      i. Remove the power cord from the wall. The ventilator should do the following:

1. Switch to battery power.
2. Sound the audible alarm.
3. Turn the AC Power Source indicator OFF.
4. Display the BATTERY ON message in the alarm window.
5. LED for internal battery will light.

      ii. Press the Alarm Reset button to clear the alarm.

      iii. Plug the AC power cord back into the wall socket.

   b. High Pressure Limit Check

      i. Lower the High Pressure Alarm setting to 5 cmH2O below the Peak Inspiratory Pressure (PIP). When the ventilator cycles to inspiration and the high pressure limit is violated, the high pressure alarm should occur. When this happens the ventilator should:

6. Immediately cycle into the expiratory phase.
7. Sound the audible alarm.

8. Display the HIGH PRES message in the alarm window.

    ii. Return the High Pressure Alarm setting to 5 cmH2O above PIP, and press the Alarm Reset button to clear the alarm.

This completes the performance check. The following Ventilator Performance Checklist may be used to document each Performance Check for your records.

Vela Ventilator Performance Checklist

This checklist is for use during the Vela Operational Verification Procedure.

Serial Number_____ Hours_____ Date_____

Verification Steps:

Verification Step	Check & Initial
1. Inspect the ventilator and components for appearance and cleanliness. Confirm the Exhalation valve, diaphragm, and air intake filter and test lungs are correctly installed. Wipe the ventilator clean if needed using a cloth moistened with an approved cleaning solution.	☐
2. Enter the User Verification Test (UVT). Press the Patient Removed touch screen icon.	
3. Test the alarm volume. Adjust as required.	☐
4. Confirm the proper functioning of the front panel lamps and LEDs.	☐
5. Confirm the proper functioning of the membrane switches.	☐
6. Complete the internal filter performance check.	☐
7. Check the patient breathing circuit on the ventilator and conduct a leak test. Make sure all needed components are firmly attached in the circuit.	☐
8. Exit the UVT and conduct performance test.	

Set the parameters to the following recommended settings:

Mode	A/C	**Inspiratory Pause**	OFF
Tidal Volume	500ml	**Sigh**	OFF
Peak Flow	60 lpm	**Square Waveform**	OFF
Breath Rate	12 bpm	**Bias Flow**	10 lpm
PEEP/CPAP	5 cmH2O	**Altitude**	Current
Sensitivity	OFF	**Inspiratory Time**	0.3 sec
Pressure Support	OFF	**Termination Sensitivity**	25%
Pressure Control	OFF	**Variable Time Termination**	3.0 sec
% O2	21	**Flow Termination**	OFF

Set the variable alarm controls as follows:

Alarm Control	Setting
High Pressure	PIP plus 5 cmH2O
Low Pressure	PIP minus 10 cmH2O
Low Minute Volume	4 Liters
High Breath Rate	16 bpm
Apnea Interval	20 secs

Verification Step	Check & Initial
9. After at least two minutes of operation compare the displayed readings to the following:	☐

Display	Reading
Minute Volume	6L +/- 1.2L
Tidal Volume	500ml +/-100ml
I:E Ratio	1:6.1 +/-10%
Breath Rate	12 bpm +/-2 bpm
PIP	Equal to Manometer +/- 5
MAP	NA
PEEP	5 cmH2O +/-2 cmH20
Inspiratory Time	0.68 sec +/-0.5 sec

Verification Step	Check & Initial
10. Check alarms	
A. Power Fail Check	☐
B. High Pressure Limit Check	☐

Signature: _____

Procedure Complete

Calibration

Note

All personnel performing preventive maintenance and product repair must be trained and certified by VIASYS Healthcare to service the product

Test Set-up

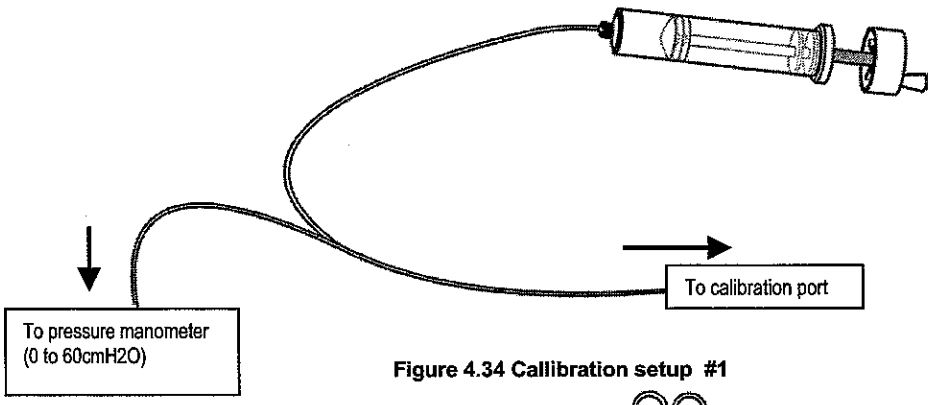


Figure 4.34 Callibration setup #1

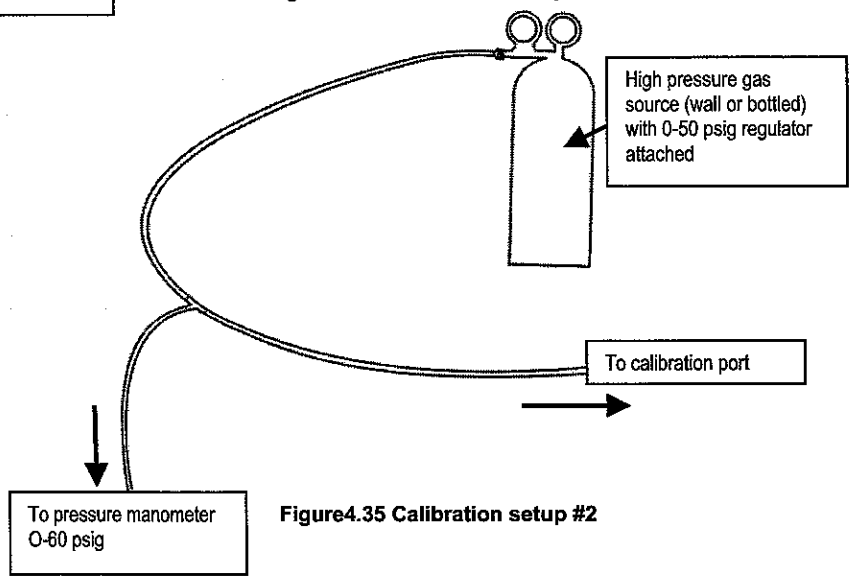
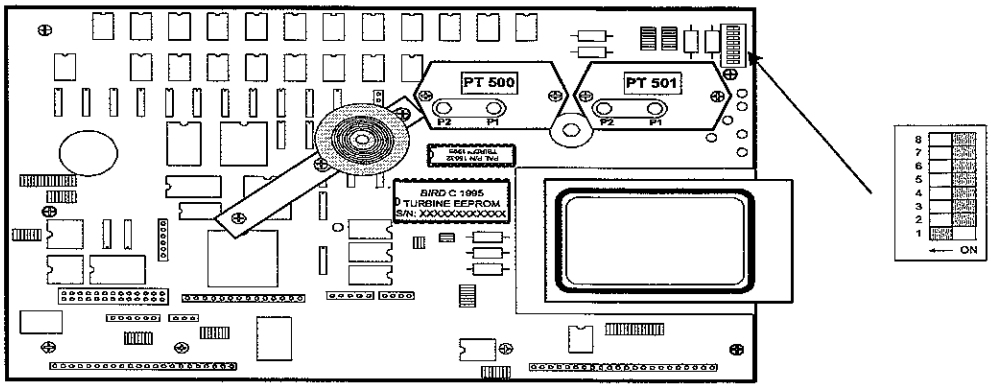


Figure4.35 Calibration setup #2

Power Up Verification/Service Verification Tests

1. Remove the top cover and battery tray as described in Chapter 3.
2. Locate DIP Switch 1 on the Main PCBA on the rear of the front panel. Place it in the ON position, as shown in figure 3.



3. Connect the Vela to a properly grounded AC source. Turn on power to the unit.

Figure 4.36 Main PCB

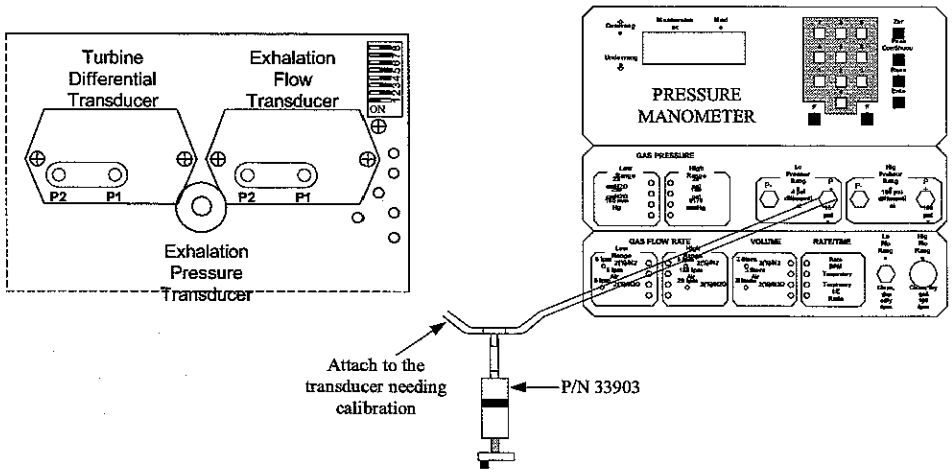


Figure 4.37 Location of transducers

4. The ventilator performs its Power On Self Test. When the self-test is complete, the screen displays "flat" waveforms and the ventilator makes no attempt to deliver a breath. This indicates that you are in a "Service" mode
5. The audible alarm should sound, press the alarm reset button to silence alarm.
6. Press the MAIN icon at the top of the touch screen
7. The SVT TEST SELECT screen displays.
8. Press CALIBRATION to access the transducer calibration screen (see figure 4.7)

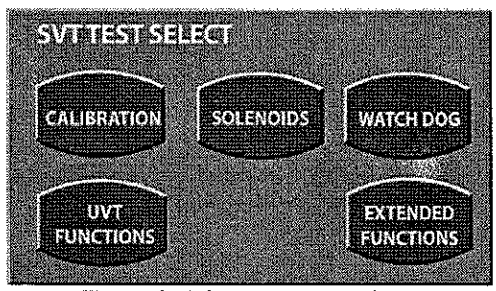


Figure 4.38 SVT Test Select Screen

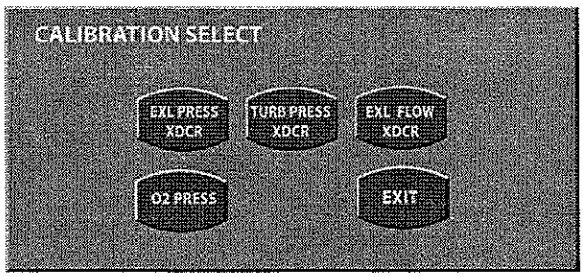


Figure 4.39 Calibration selection screen

Exhalation Pressure Transducer

1. Press the EXH PRESS XDCR touch screen icon from the CALIBRATION SELECT Screen. The EXHL PRESS CALIB screen displays showing both pressures as "Pending" and with the instruction "Apply 0 cmH2O and press button".

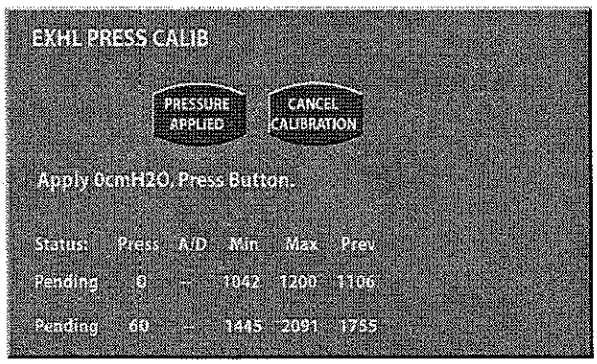

EXHL PRESS CALIB
PRESSURE APPLIED
CANCEL CALIBRATION
Apply 0cmH2O, Press Button.
Status: Press A/D Min Max Prev
Pending 0 -- 1042 1200 1106
Pending 60 -- 1445 2091 1755

Figure 4.40 Exhalation Pressure Transducer Calibration screen #1

2. Disconnect tubing from the exhalation pressure transducer before continuing with the procedure (see figure 4.6 for location of the transducers).With no tubing attached to the exhalation pressure transducer, press the PRESSURE APPLIED touch screen icon for zero calibration.
3. When the calibration is complete, the screen legend changes to read "Apply 60 cmH2O, Press Button" and the zero pressure value now says "OK" with an A/D value added.

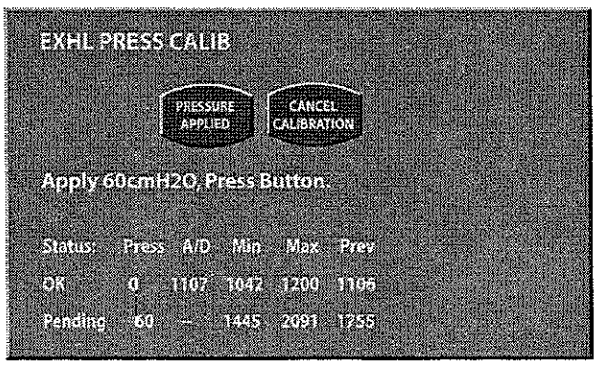

EXHL PRESS CALIB
PRESSURE APPLIED
CANCEL CALIBRATION
Apply 60cmH2O, Press Button.
Status: Press A/D Min Max Prev
OK 0 1107 1042 1200 1105
Pending 60 -- 1445 2091 1755

Figure 4.41 Exhalation Pressure Transducer Calibration screen #2

5. Attach the calibration setup shown in figure 1 to the Exhalation Pressure Transducer port (see figure 4 for location).
6. Turn the calibration syringe handle clockwise to generate positive pressure.

7. When the pressure manometer reads 60 cmH2O +/- 0.6 cmH2O, press the PRESSURE APPLIED touch screen icon.

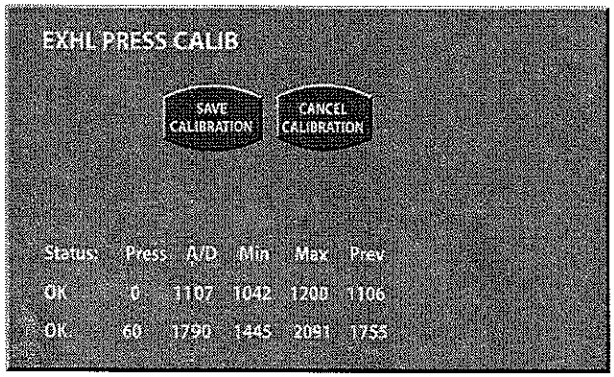

EXHL PRESS CALIB
SAVE CALIBRATION
CANCEL CALIBRATION
Status Press A/D Min Max Prev
OK 0 1107 1042 1200 1106
OK 60 1790 1445 2091 1755

Figure 4.42 Exhalation Pressure Transducer Calibration screen #3

8. When the calibration is completed, the screen displays OK for both calibrations. SAVE CALIBRATION and CANCEL CALIBRATION. Press SAVE CALIBRATION to save and return to the transducer calibration selection screen.

CAUTION

Make sure that your pneumatic connection is to the Exhalation Pressure transducer before applying 60 cmH2O pressure. If the 60.0 cmH2O pressure is inadvertently applied to the Exhalation Differential (Flow) transducer **it will permanently damage the transducer.**

Turbine Pressure Transducer

1. From the CALIBRATION SELECT screen, press TURB PRESS XDCR.
2. The first Turbine Pressure calibration screen displays showing both calibration pressures as pending and with the legend "Apply 0 cmH2O and press button".

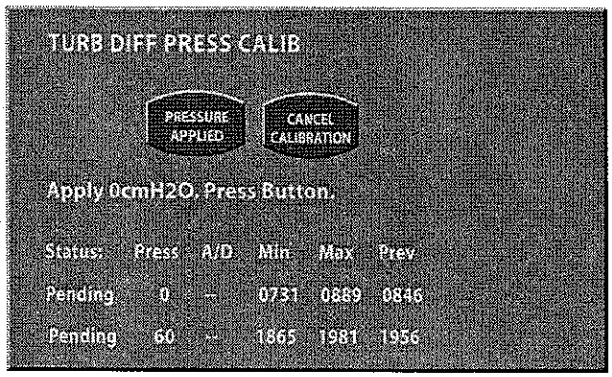

TURB DIFF PRESS CALIB
PRESSURE APPLIED
CANCEL CALIBRATION
Apply 0cmH2O. Press Button.
Status Press A/D Min Max Prev
Pending 0 -- 0731 0889 0846
Pending 60 -- 1865 1981 1956

Figure 4.43 Turbine Pressure Zero calibration screen #1

2. Disconnect tubing from the transducer before continuing with the procedure. See figure 4.6 for location of the transducers
3. With no tubing attached to the turbine pressure transducer, press the PRESSURE APPLIED touch screen icon for zero calibration.
4. The screen legend changes to read "Apply 60 cmH2O, Press Button" and the status of the zero calibration line now reads "OK" with a recorded A/D value.

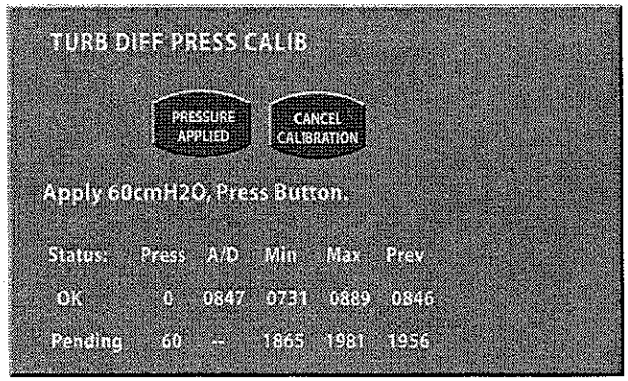

TURB DIFF PRESS CALIB
PRESSURE APPLIED
CANCEL CALIBRATION
Apply 60cmH2O, Press Button.
Status: Press A/D Min Max Prev
OK 0 0847 0731 0889 0846
Pending 60 - 1865 1981 1956

Figure 4.44 Turbine Pressure 60 cmH2O calibration screen #2

5. Attach the calibration setup shown in figure 1 (available as a kit from VIASYS Healthcare) to the port P2 on the turbine pressure transducer (see figure 4.6 for location).
6. Turn the calibration syringe handle clockwise to generate positive pressure.
7. When the pressure manometer reads 60 cmH2O +/- 0.6 cm H2O, press the PRESSURE APPLIED touch screen icon.
8. The screen displays OK for both pressures and SAVE CALIBRATION and CANCEL CALIBRATION. Press SAVE CALIBRATION to save and return to the transducer calibration selection screen.

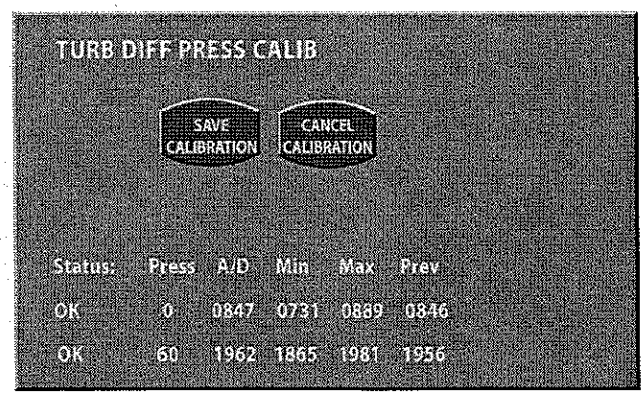

TURB DIFF PRESS CALIB
SAVE CALIBRATION
CANCEL CALIBRATION
Status: Press A/D Min Max Prev
OK 0 0847 0731 0889 0846
OK 60 1962 1865 1981 1956

Figure 4.45 Turbine Pressure 60 cmH2O calibration screen #3

9. Reconnect tubing to the port after calibration.

CAUTION

Make sure that your pneumatic connection is to the Turbine Differential transducer before applying 60 cmH2O pressure. If the 60.0 cmH2O pressure is inadvertently applied to the Exhalation Differential (Flow) Transducer it will be permanently damaged and require replacement..

Exhalation Flow Transducer Calibration

1. From the CALIBRATION SELECT screen, press EXL FLOW XDCR. The first Exhalation Differential Pressure (Flow) calibration screen displays.

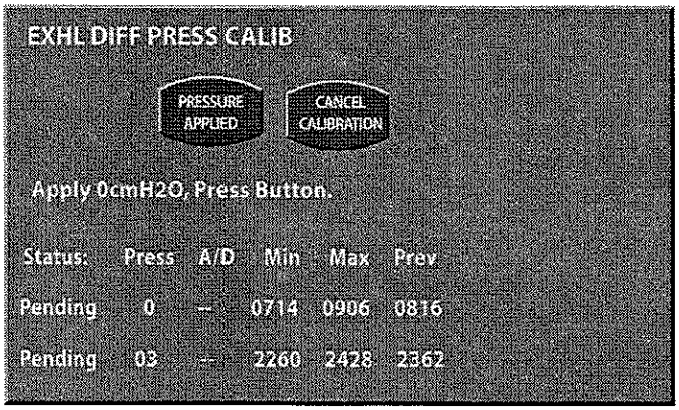

EXHL DIFF PRESS CALIB
PRESSURE APPLIED
CANCEL CALIBRATION
Apply 0cmH2O, Press Button.
Status: Press A/D Min Max Prev
Pending 0 -- 0714 0906 0816
Pending 03 -- 2260 2428 2362

Figure 4.46 Exhalation Differential Pressure (Flow) screen #1

2. Disconnect tubing from the transducer before continuing with the procedure. See figure 4.6 for location of the transducers
3. With no tubing attached to the transducer, press the PRESSURE APPLIED touch screen icon for zero calibration.
4. When the calibration is complete, the status of the zero pressure line reads "OK" and an A/D value is recorded. The screen legend changes to read "Apply 3 cmH2O, Press Button."

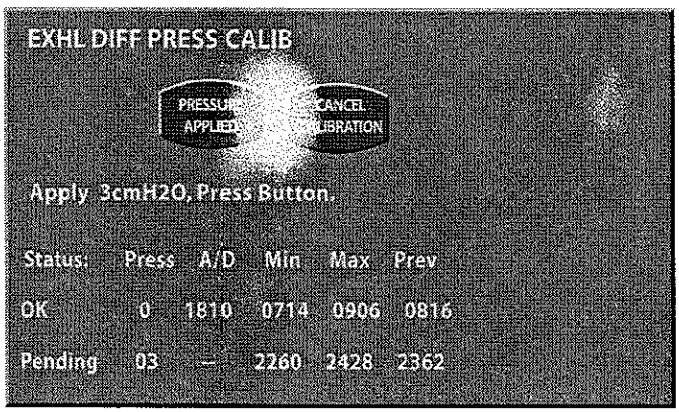

EXHL DIFF PRESS CALIB
Apply 3cmH2O, Press Button.
Status: Press A/D Min Max Prev
OK 0 1810 0714 0906 0816
Pending 03 -- 2260 2428 2362

Figure 4.47 Exhalation Differential Pressure (Flow) screen #2

5. Attach the calibration setup shown in figure 1 to the Exhalation Differential (Flow) Transducer port P2 (see figure 4.6 for location).
6. Turn the calibration syringe handle clockwise to generate positive pressure.
7. When the pressure manometer reads 3 cmH2O +/- 0.6 cm H2O, press the PRESSURE APPLIED touch screen icon.
8. When the calibration is complete, the status of the zero pressure line reads "OK" and an A/D value is recorded. The screen displays SAVE CALIBRATION and CANCEL CALIBRATION. Press SAVE CALIBRATION to save and return to the transducer calibration selection screen.

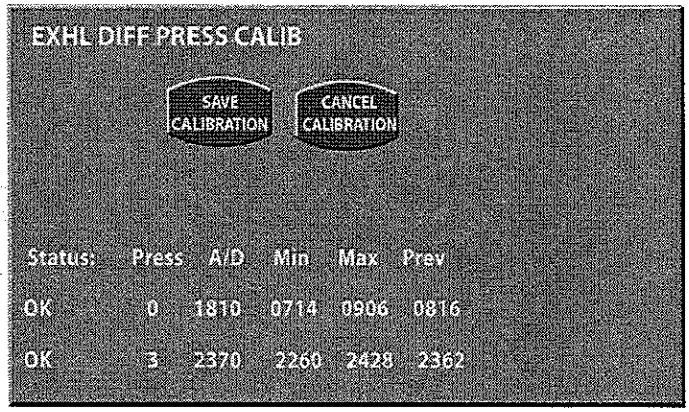

EXHL DIFF PRESS CALIB
SAVE CALIBRATION
CANCEL CALIBRATION
Status: Press A/D Min Max Prev
OK 0 1810 0714 0906 0816
OK 3 2370 2260 2428 2362

Figure 4.48 Exhalation Differential Pressure (Flow) screen #3

9. Remove calibration setup from exhalation differential pressure (flow) transducer port and reconnect tubing before continuing.

Oxygen Pressure Transducer Calibration

1. From the CALIBRATION SELECT screen, press O2 PRESS. The Oxygen Pressure Transducer Calibration screen #1 appears.

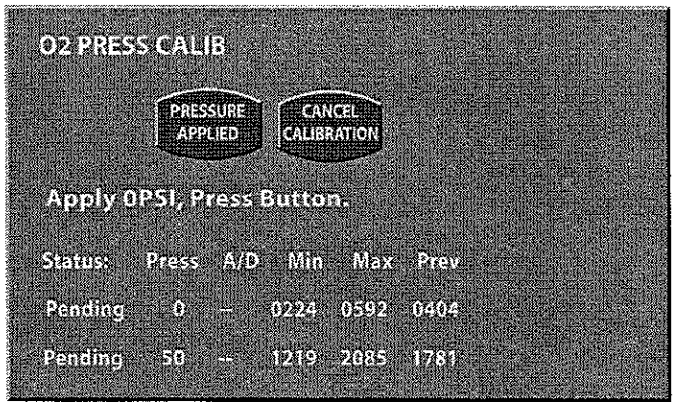

O2 PRESS CALIB
PRESSURE APPLIED
CANCEL CALIBRATION
Apply 0PSI, Press Button.
Status: Press A/D Min Max Prev
Pending 0 -- 0224 0592 0404
Pending 50 -- 1219 2085 1781

Figure 4.49 O2 Pressure calibration screen #1

2. With no tubing attached to the Vela, press the PRESSURE APPLIED touch screen icon for zero calibration.
4. When the calibration is complete, the status of the zero pressure line reads "OK" and an A/D value is recorded (see figure 4.19). The screen legend changes to read "Apply 50 cmH2O, Press Button."

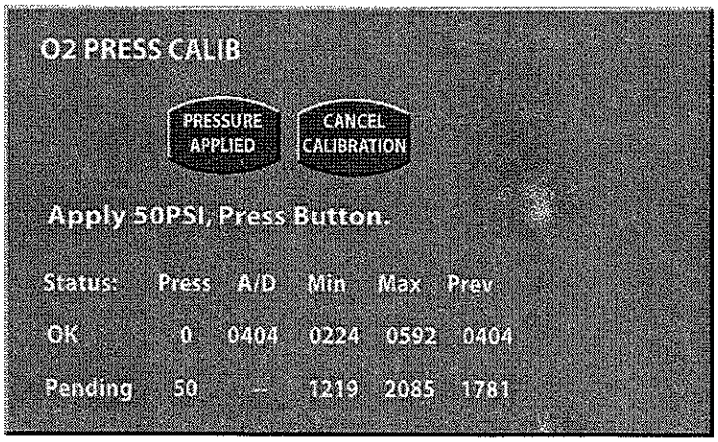

O2 PRESS CALIB
PRESSURE APPLIED
CANCEL CALIBRATION
Apply 50PSI, Press Button.
Status: Press A/D Min Max Prev
OK 0 0404 0224 0592 0404
Pending 50 -- 1219 2085 1781

Figure 4.50 O2 Pressure calibration screen #2

5. Attach the calibration setup tube to the nebulizer port on the front of the Vela (see figure 4.20).
6. Press the Nebulizer membrane button on the front panel to open the solenoid.
7. Apply gas from the high pressure gas source at 50 psig pressure.
8. When the pressure manometer reads 50 psig, press the PRESSURE APPLIED touch screen icon.
9. When the calibration is complete, the status of the 50 psig pressure line reads "OK" and an A/D value is recorded (see figure 4.21).The screen displays SAVE CALIBRATION and CANCEL CALIBRATION. Press SAVE CALIBRATION to save and return to the transducer calibration selection screen.

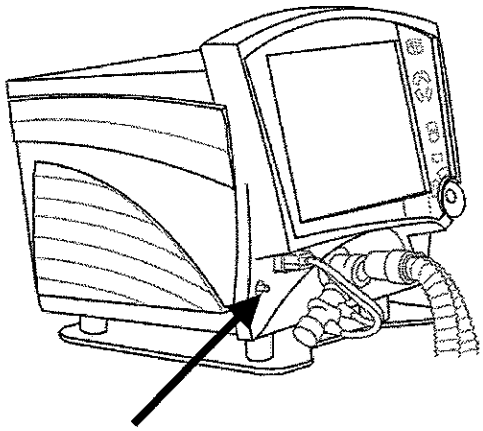


Figure 4.51 Nebulizer port on the Vela

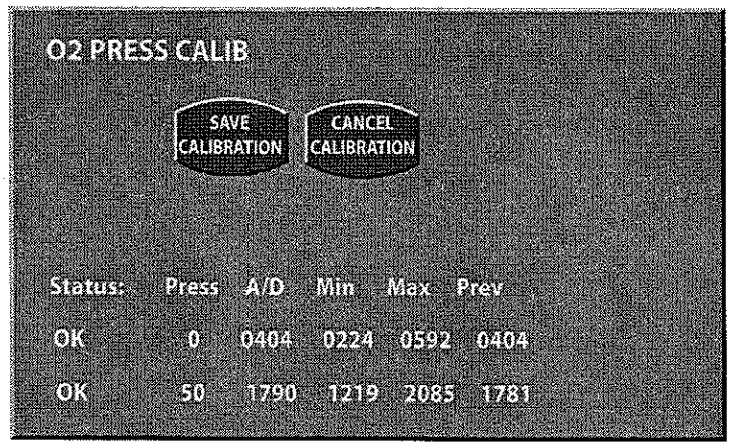

O2 PRESS CALIB
SAVE CALIBRATION
CANCEL CALIBRATION
Status: Press A/D Min Max Prev
OK 0 0404 0224 0592 0404
OK 50 1790 1219 2085 1781

Figure 4.52 O2 Pressure calibration screen #3

Regulator calibration:

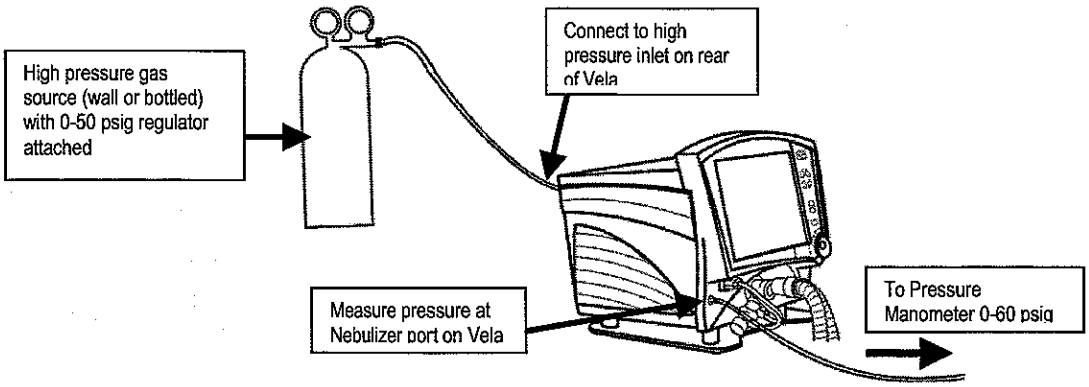

High pressure gas source (wall or bottled) with 0-50 psig regulator attached
Connect to high pressure inlet on rear of Vela
Measure pressure at Nebulizer port on Vela
To Pressure Manometer 0-60 psig

Figure 4.53 Calibration setup for Regulator Calibration

1. Enter the SVT mode as detailed in this procedure then press the MAIN icon. From the CALIBRATION SELECT screen, press the SOLENOID touch screen icon to enter the solenoid mode.
2. Connect gas source to the high-pressure port on the rear panel (see figure 18). Using a 0-50 psig regulator, apply 50 psig gas pressure. In turn, press the O2-0, O2-1, and O2-2 solenoid touch screen icons.
3. Using a calibrated manometer, measure the pressure at the Nebulizer port on the front of the ventilator for each solenoid (see figure 17). It must read 40 psig +/- 1. Adjust the *internal adjustment* regulator to achieve the correct pressure at the Nebulizer port (see figure 4.22)

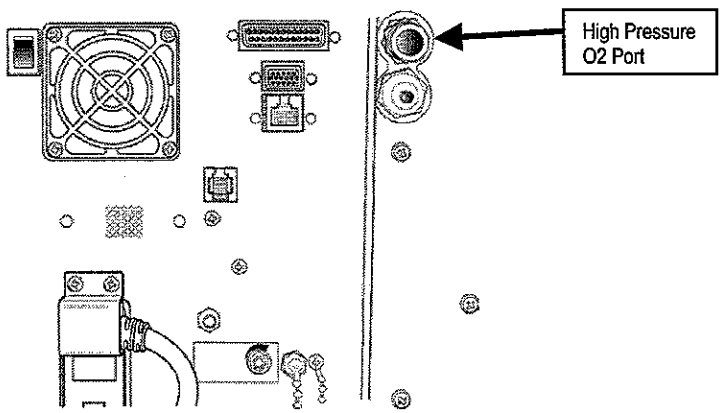


Figure 4.54 Vela Rear Panel

3. Perform the Operational Verification Procedure described in this chapter once the calibration is complete. .

Note

All personnel performing preventive maintenance and product repair must be trained and certified by VIASYS Healthcare to service the product

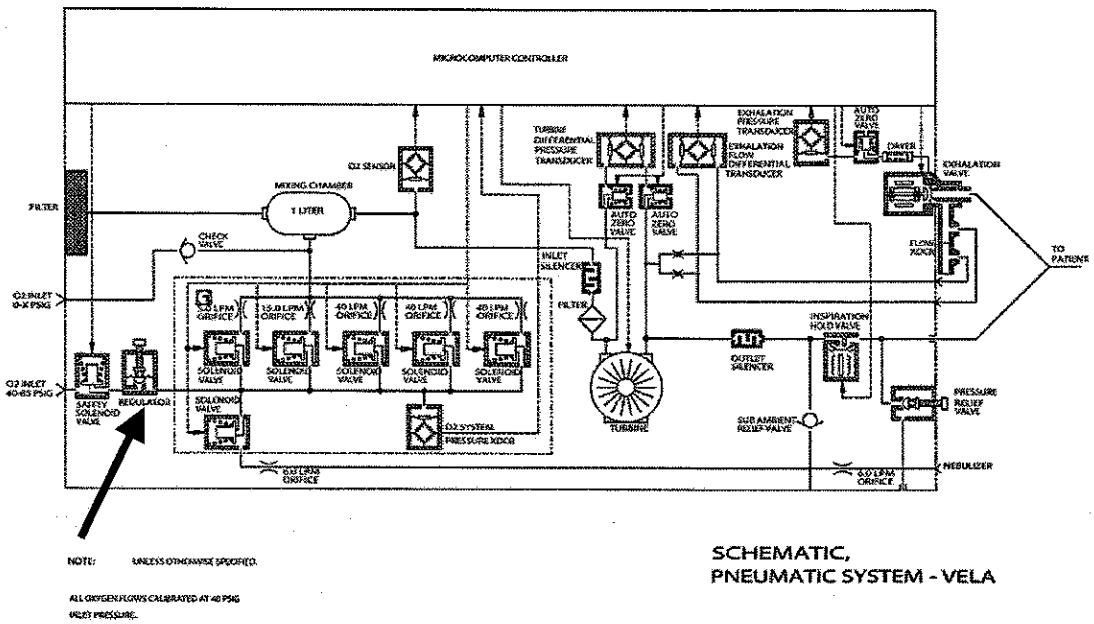


Figure 4.56 internal adjustment regulator location

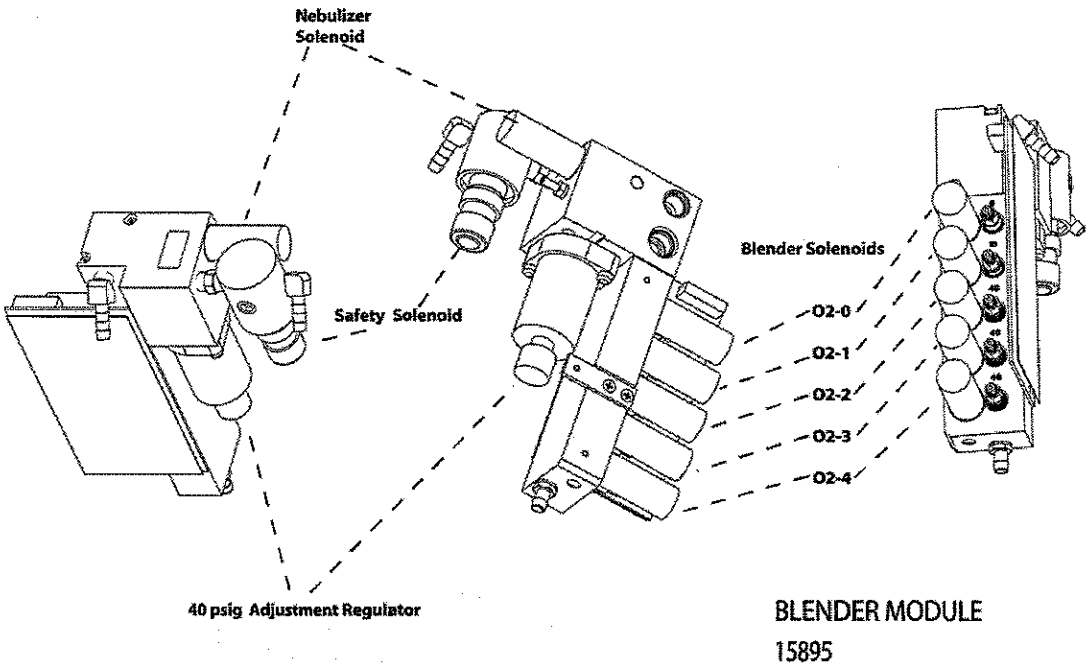


Figure 4.57 Location of O2 Blender solenoids

Oxygen Sensor Calibration

From the Special Functions menu, press the FIO2 MON CALIBRATION touch screen icon

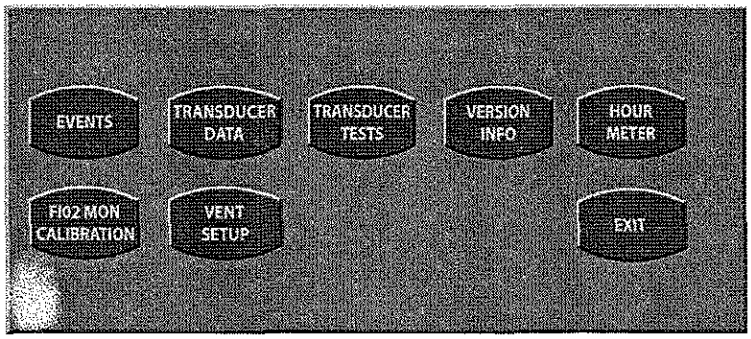


Figure 4.58 Special Functions menu,

The following screen will appear.

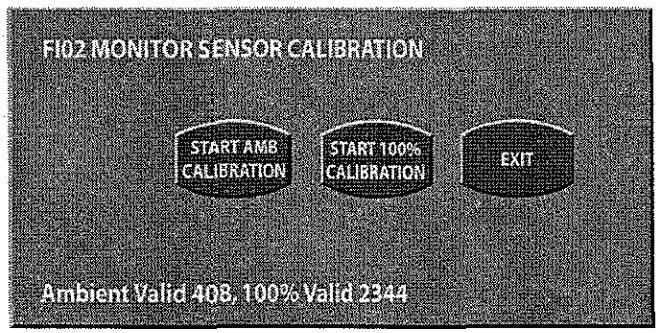


Figure4.59 FiO2 Sensor Calibration Ambient Air

Attach 100% O2 at 50psig to the high-pressure inlet on the rear of the Vela.

Press the START AMB CALIBRATION touch screen icon. The machine will take 3-5 minutes to perform the calibration and the following screen will appear while the calibration is in progress.

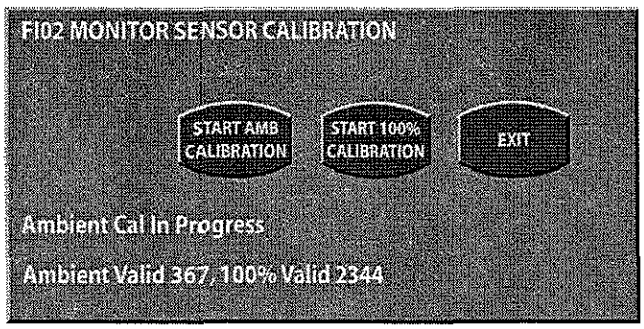


Figure 4.60 Ambient Calibration in progress.